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Papers from the 11th Australasian Plant Conservation Conference, Melbourne, 14-18 November 2016

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Photo: John Patyowski

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Australasian Plant Conservation is a forum for
information exchange for all those involved in
plant conservation: please use it to share your
work with others. Articles, information snippets,
details of new publications or research, and
diary dates are welcome. General articles on any
plant conservation issue are most welcome.

**The deadline for the March – May 2017 issue
is 10 February 2017.** The special theme for the
issue is papers from the *11th Australasian Plant
Conservation Conference*. If you are intending to
submit an article or wish to discuss possibilities,
please email the editor, Paul Adam:
editor@anpc.asn.au

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This issue

From the editor by <i>Paul Adam</i>	2
President's Report by <i>Linda Broadhurst</i>	3
The threat of myrtle rust to the conservation of the endangered tree, <i>Gossia gonoclada</i> (Myrtaceae) in south east Queensland by <i>Tamara Taylor, Louise Morin, Geoff Pegg and Jacinta Zalucki</i>	6
Holding on to Tea-tree fingers: a critically endangered fungus by <i>Tom W. May and Sapphire J.M. McMullan-Fisher</i>	8
Fontainea dude thinks he's a lady – recovery of the Coastal Fontainea and investigation into temporal monoecy by <i>Dianne Brown, Rhonda James and Annette McKinley</i>	11
Threatened species management on the rural-urban interface: insight from a critically endangered shrub by <i>John Patykowski, Matt Dell and Maria Gibson</i>	13
Parks and people: Promoting plant conservation by <i>Anne Cochrane</i>	15
New approaches to plant conservation challenges. Conservation for people and nature, benefiting both. Reflecting on FOG's experience, learning and vision by <i>Geoff Robertson</i>	17
Effect of fire and digestion by herbivores on seeds of the exotic invasive species <i>Acacia nilotica</i> in savanna at Baluran National Park Indonesia by <i>Sutomo and Eddie van Etten</i>	20

Regular features

News from the Australian Seedbank Partnership	22
ANPC Member Profile	24
Book reviews	25
ANPC Workshop Reports	26
Research Roundup.....	30
ANPC Corporate Members	33

The production of this edition of *Australasian Plant Conservation* was supported by the **NSW Environmental Trust** through its Lead Environmental Community Groups program.



From the editor

PAUL ADAM

This issue contains articles derived from presentations at the ANPC's 11th Australasian Plant Conservation Conference (APCC11), held in Melbourne in November 2016. The theme of the conference was *New approaches to plant conservation. Challenges in the modern world*. It is certainly clear that conservation faces many challenges in today's world, and predictions for the future suggest that many of these challenges are likely to intensify. It would be easy to think all is gloom and doom, but I was very impressed by the enthusiasm and activity of the participants at the conference. It is not a case of lying down in despair.

The conference was held at the Royal Botanic Gardens Victoria, Melbourne, in the splendid surroundings of Mueller Hall (Baron von Mueller was perhaps the most prolific botanist to have worked in Australia, but he was also, paradoxically by modern standards, an enthusiastic disperser of blackberries)

The conference saw the launch of the ANPC calendar– if you've not got one already, be quick before they sell out. A nice touch was that the presentation sessions were named after the threatened species which feature in the calendar.

The conference ran very smoothly – a tribute to the behind the scenes preparation by the organising committee, the ANPC staff, the caterers and the Botanic Gardens staff whose hard work made it all happen. The chair of the Organising Committee, John Morgan, deserves particular congratulations. The conference was followed by a day of field excursions; my regret is that it was only possible to go on one excursion! Excursions were blessed with splendid weather.



APCC11 Keynote Speaker, Threatened Species Commissioner Gregory Andrews, talking about the 30 plants the federal government is aiming to save under the Threatened Species Strategy. Photo: Jo Lynch

After the Melbourne conference, I and a number of other participants, headed across the Tasman to attend the joint conference of the Society for Ecological Restoration Australasia and the New Zealand Ecological Society in Hamilton. After the simplicity of the Melbourne programme, in New Zealand the choice was a shock, with up to 7 parallel sessions. One feature of interest was the range of presentations discussing urban ecology– a topic which is globally vibrant, and, as the proportion of the global population living in cities continues to increase, one which will become even more important.

The issue opens with the President's report, an opportunity to catch up on the numerous recent achievements of the ANPC – we certainly punch above our weight.

Fungi are an important component of biodiversity, which has often been neglected in conservation planning. Fungi can be both friends and foes; and as pathogens they include a number of emerging threats to our flora. Tamara Taylor *et al.* discuss the impacts of myrtle rust on one of Australia's rarest trees, *Gossia gonoclada*. Sapphire McMullen-Fisher and Tom May present the remarkable story of one of Australia's rarest macrofungi *Hypocreopsis amplexans*, the only macrofungus currently listed under the Victorian Flora and Fauna Guarantee Act (1988). *Hypocreopsis* is unusual in being fungicolous, that is a fungus which lives on another fungus, which in turn lives on a tea tree.

Dianne Brown *et al.* introduce another very rare rainforest species, the coastal *Fontainea* in northern New South Wales, where a complication is the apparent ability of at least some individuals to change sex – whoever said plants are boring!

John Patykowski *et al.* discuss aspects of the reproductive ecology of the critically endangered, *Pomaderris vacciniifolia*, which is apparently in decline and for which seed dispersal is limited. *Pomaderris* is a genus with a number of very rare and locally distributed species; the findings of this study may have implications for both other species of the genus and for other species with similar characteristics.

Anne Cochrane emphasises the opportunities for involving the public, pointing out that the public are better aware of threatened fauna than they are flora. In many circumstances visitation to very rare species is discouraged, but Anne shows that there can be opportunities where visitation can be managed and appropriate interpretive material provided.

Providing an international contribution, Sutomu and Eddie van Etten discuss the interactions between *Acacia nilotica*, buffalo and fire in Indonesian savanna. *Acacia nilotica* is an invasive species in rangelands in Australia, but studies on the species in Australia are few.

This issue's News from the Australian Seed Bank Partnership provided by Jenny Guerin and Dan Duval outlines seed collecting activities in South Australia.

The Regular Features section contains a wide range of news and information, including reports of recent workshops conducted by the ANPC Project Officer in western New South Wales, a member profile of Doug Bickerton, introducing his work not just in South Australia but also in the Kimberley, and the always useful Research Roundup.

The ANPC gratefully acknowledges the support of all our APCC11 sponsors, and in particular the following major sponsors:



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President's Report

LINDA BROADHURST

Australian Network for Plant Conservation Inc. (ANPC)

To the Annual General meeting, 15 November 2016

This is the 25th year of the ANPC and it is pleasing to see that we continue to maintain our role as Australia's key plant conservation organisation.

Our submission on the proposed NSW Biodiversity reforms (*Biodiversity Conservation Act Bill 2016* and *Local Land Services Amendment Bill 2016*) highlights one area where the ANPC has been active this year. This submission was coordinated by ANPC Vice President Bob Makinson and I thank him and several of the committee members for their efforts in finalising this document. Following on from the Biosecurity submission Bob also coordinated last year, I recently attended the first environmental biosecurity stakeholder engagement forum in October at the Department of Agriculture and Water Resources where the ANPC was a key stakeholder. The purpose of the forum was to provide an opportunity for relevant stakeholders to discuss environmental biosecurity matters and share ideas, with the focus on better engagement and collaboration on key environmental biosecurity issues, such as Myrtle rust and other plant pathogens.

Last year we entered into a partnership with the Society for Ecological Restoration Australasia (SERA) and assisted in the development of the National Standards for the Practice of Ecological Restoration in Australia which were launched at the National Seed Science Forum in March.



There continues to be a high level of community interest and support for plant conservation and the ANPC continues to enhance its capacity to play a key role in facilitating and communicating plant conservation initiatives throughout Australia. This is reflected in the ongoing participation of land managers, government departments, industry, the volunteer conservation movement and the broader community in ANPC workshops and conferences, and the requests we get from other organisations and government to participate in and comment on various flora conservation initiatives.

While I continue to be greatly impressed by the dedication and breadth of knowledge of ANPC members, we still face significant challenges. We need to ensure

that we effectively promote the increased recognition among the broader Australian community of the inherent value and cultural significance of the flora. We also need to ensure that we remain focussed on our core business of facilitating the conservation of a unique flora, the recovery of threatened species, ecological restoration and the management of remnant vegetation.

2016 ANPC Conference APCC11

The ANPC's 11th national conference, the 11th Australasian Plant Conservation Conference, is being held in Melbourne this week – the ANPC's primary event for this year.

The conference is bringing together a diverse range of participants including botanists, ecologists, land managers, and on-ground plant conservation managers from around Australia to review and highlight plant conservation achievements and challenges. The theme for the conference is *"New Approaches to Plant Conservation Challenges in the Modern World"*. Together we will explore existing approaches to plant conservation across Australia, highlighting significant achievements and evaluating the effectiveness of our current approaches. The conference is also providing an important opportunity to explore what are the major challenges Australian plants will be facing in the next few decades, and to identify new directions and approaches that will be required if we are to continue to conserve our unique floral heritage.

Changing climates and ongoing extensive habitat degradation continue to challenge many plant species. Being at the leading edge of this change, we will be held to account by future generations of Australians should we not do everything possible to arrest and reverse species decline. Developing the logistical and technological capacity to ensure that we have sufficient high quality seed for species restoration and understanding how to best use mutualistic organisms will undoubtedly improve our capacity to recover and conserve plant species. Perhaps a more significant challenge is how to reconnect Australians with our many wonderful and unique plants, and developing conservation approaches that maximise the benefits for people and plants are required to do this successfully. By exploring the frontiers of Australian plant conservation through new and emerging ideas we will begin developing adaptive approaches to conservation that will be necessary to respond to future challenges.

I would like to thank the sponsors and the conference organising committee: John Morgan, Ben Zeeman, Susan Hoebee, Trevor Edwards, Susanna Venn, David Cantrill, Paul Gibson-Roy, David Coates, Jo Lynch, Martin Driver and Karina Salmon for their huge effort in coordinating the conference, along with the team of La Trobe University student volunteers. In particular, Jo Lynch and Carly Westbye in the ANPC office have worked tirelessly

to ensure that the conference will run smoothly and have dealt with the numerous details and issues that have arisen since preparation began more than a year ago.

Workshops, Projects and Outreach

ANPC Project Manager, Martin Driver, has had a very busy year delivering a total of 13 workshops in NSW. Six Plant Identification workshops were held in the Riverina Local Land Services region: at Cocoparra National Park, Tarcutta Valley, and four Rangelands Paddock Walks supported by the NSW Environmental Trust and Riverina LLS. More of these workshops are planned for next year. In addition, Plant Identification workshops were held in the Murray LLS region for Barham Landcare and Corowa Landcare, along with three in the Western LLS region at Broken Hill and White Cliffs (with a fourth scheduled for Yantabulla in December). Two Seed Collection Workshops at Broken Hill and Menindee were also held with another scheduled for Corowa in December. ANPC Workshop participants this year have exceeded 250 people across NSW.

Another successful Myrtle rust workshop was held in Darwin in February by ANPC Vice President Bob Makinson, with support from the Bjarne K Dahl Trust, the Royal Botanic Gardens and Domain Trust, and Charles Darwin University.

The Bring Back the Banksias project has continued, with an e-newsletter commencing, and a proposed workshop with Trust for Nature Victoria and North East CMA scheduled for next week, 25 November. There is another workshop scheduled in western Victoria for 24 February 2017 in conjunction with Glenelg Hopkins CMA and the Victorian Volcanic Plains genetic studies progress and other related population research studies.

The ANPC collaborated with the Australian Seed Bank Partnership and provided assistance with organisation of the National Seed Science Forum held in March at the Australian Botanic Garden Mt Annan. This important conference brought together researchers from across Australia to improve our collective understanding of seed biology as well as improve germination and long term storage techniques. It was also an important networking opportunity for the ANPC to connect researchers and practitioners with a number of linkage opportunities being pursued.

In July Martin and I presented at the Australian Association of Bush Regenerators (AABR) Restoration Standards Forum where a range of practitioner-oriented talks were presented. This provided an opportunity to highlight the ANPC to a new audience and fostered some new linkages and participants in later ANPC workshops.

Martin participated in a NSW Office of Environment and Heritage run workshop in October which engaged a group of statewide ecological specialists to model and test biometric assumptions for the state Biometric Assessment Modelling.

Over the past 12 months, the ANPC has continued to coordinate the subcontracting of the Orchid Conservation Program to the Royal Botanic Gardens Victoria. Most of the individual projects in this program are now complete, with only one project still continuing with Alcoa Portland, and the Program is now run through the RBGV.

More broadly our outreach efforts continue to expand through a range of social media with the regular sharing of news and events in plant conservation via Twitter, Facebook, Google+, and LinkedIn. The monthly ANPC News email newsletter currently reaches 629 subscribers.

The new ANPC website which was launched last year has continued to improve, with online payment processing for membership applications, renewals, and publication sales introduced this year. New pages were also added including the hosting of the new publication '*Climate-ready revegetation – a guide for natural resource managers*'. A threatened plant slideshow was developed to promote the 12 Flagship APCC11 threatened plants, and this has also now been published as the ANPC's first fund raising calendar. "*Australian Plant Identification – A Resource Bibliography. Using references to help in identifying native and introduced plants*" has been developed and will be published on the website in late 2017. An ANPC blog was also commenced and graphic design software was purchased for the development of educational and promotional material.

The new ANPC Prospectus was published this year highlighting our capabilities, and the many ways both members and non-members can help further promote and improve plant conservation, such as through memberships, sponsorship, donations, bequests, project support, collaboration and volunteering. The prospectus has been sent to relevant companies and organisations throughout the year to seek new funding and sponsorship opportunities.

Our bulletin, *Australasian Plant Conservation*, has continued to publish high-quality articles relevant to a broad range of plant conservation practitioners and managers, under the editorship of Paul Adam. On behalf of the Committee and all members I would like to sincerely thank Paul for his significant effort in ensuring that APC continues to be a quality and well respected publication for the communication of plant conservation issues in Australia. Full colour printing of APC was introduced this year which has greatly improved its appeal and I'd like to thank Carly Westbye and Siobhan Duffy for all their work on this.

Staffing

Many thanks to our office staff Jo Lynch and Carly Westbye who continue to work well beyond the call of duty for the ANPC. Their dedication and the quality of their work make my job and the work of the Committee so much more effective, and ensures that the ANPC

continues to function as a highly respected conservation organisation. I would also like to thank Merryl Bradley for the many roles she still plays in supporting the ANPC. Merryl has continued in the position of Treasurer and as a volunteer in the office. Her experience and assistance is a great asset to the ANPC.

I am grateful to Committee members for their tremendous support over the year. All of the Committee members have significant commitments outside the ANPC and it is often challenging to devote the time required as active committee members. The involvement in the committee by all Committee members is a clear demonstration of their dedication to the ANPC and its goals in improving plant conservation. I also thank Cathy Offord and Melissa Millar for agreeing to join the ANPC Committee out of session this year. Committee member Helena Mills will be leaving the committee this year and I sincerely thank her for her time and support over the last two years.

Funding

Our financial situation will be reported on in detail separately at the AGM but we continue to broaden our sources of income.

This year we have been successful with a significant number of funding opportunities – in particular \$45,500 over the next two years from the Threatened Species Recovery Hub for updating the ANPC's Translocation Guidelines. I would particularly like to thank David Coates for seeking this funding. Also:

- NSW Environmental Trust's Lead Environmental Community Groups grant for 2016/17 for website development and Plant ID workshops.
- Normal Wettenhall Foundation biodiversity conservation grant for *Bring Back the Banksias Project* – workshop planning.
- Greening Australia for *Revegetating Threatened Riverina Sandhill Woodland Communities* field day funded by NSW Environmental Trust.
- Australian Seed Bank Partnership for assistance with the National Seed Science Forum 14-16 March 2016 – scientific committee, planning and promotion.
- Completed a Communities for Nature Grant in Victoria for *Saving the Federally Listed Metallic Sun-Orchid and Wimmera Spider-Orchid from Weed Invasion*.
- Riverina Local Land Services for four Rangelands Paddock Walks – one day Plant ID field days.
- Western Local Land Services for two seed collection workshops and four plant identification workshops.
- Charles Darwin University for the Myrtle rust workshop.
- One pending Environmental Trust grant application.

I would particularly like to thank Jo Lynch and Martin Driver for the great efforts they have put in with these successful projects and grant applications and acknowledge their efforts with one other unsuccessful Environmental Trust application.

The coming year

Several workshops and projects are already in the planning stage for the coming year. These include:

- More seed collection and plant ID workshops.
- Commence the review of the ANPC's Translocation Guidelines.
- Complete the introduction of new online financial management software to replace the outdated MYOB software.

- Investigate the adoption of an online membership database to replace outdated Microsoft Access database.
- Ongoing update and improvement of the ANPC website and online membership payment system.
- Investigate potential for an ANPC Forum for late 2017.

This has been my first term as President and it has been a pleasure and a privilege to work with all of you. I have thoroughly enjoyed being part of the executive and working in an organisation that does so much for plant conservation in Australia. I see an important future for the ANPC playing a key role in plant conservation across Australia and the region more broadly.

The threat of myrtle rust to the conservation of the endangered tree, *Gossia gonoclada* (Myrtaceae) in south east Queensland

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Myrtle rust (*Puccinia psidii*) is a fungal plant pathogen that rapidly spread throughout vegetation along the east coast of Australia after its detection in 2010. This biotrophic fungus has an unusually large number of host species, with 346 taxa from 57 genera within the Myrtaceae family identified as being susceptible (Giblin and Carnegie, 2014). The disease caused by the fungus adversely affects the growth of new shoots and leaves and, in highly susceptible species, all the new season's foliage growth dies. In some species, recurrent infection of buds prevents flower and fruit development, which is likely to have long-term impacts on reproduction. *Gossia gonoclada* is an endangered species that is highly susceptible to myrtle rust. Data collected over the last three years indicate that the disease is affecting the health and reproductive capacity of the species.

Gossia gonoclada

Gossia gonoclada (formerly *Austromyrtus gonoclada* F.Muell. ex Benth.) N. Snow & Guymer (Myrtaceae) is a small to medium sized tree only found in dry rainforest and riverine scrubs of the greater Brisbane area.

The species has shiny, opposite leaves that can be pink in new growth and produces flowers in late spring, followed by black ovoid fruit (1cm) from January to March. Naturally occurring trees are generally found on alluvial terraces that are often subject to inundation at peak tides and floods.



Healthy *Gossia gonoclada* flowers. Photo: Tamara Taylor

The earliest herbarium samples of *G. gonoclada* were collected between 1858 and 1875 from a range of locations along the Brisbane River. Following these initial records, the species was not recorded for over 100 years and was thought to be extinct as a result of wide-scale clearing of riparian vegetation throughout the early 1900s. However, in 1986 a small population of *G. gonoclada* was discovered in Logan City, Queensland by local botanists Glenn Leiper and Janet Hauser. A search along the Logan and Brisbane Rivers located a small number of additional individual trees. It is likely that other trees have yet to be found, however the species remains extremely rare.

Gossia gonoclada was listed as endangered under the Queensland Nature Conservation (Wildlife) Regulation 1994, and in July 2000 was listed as endangered under the EPBC Act. In 2001 the 'Recovery Plan for the angle-stemmed myrtle *Austromyrtus gonoclada* 2001-2005' was released by the Environmental Protection Agency, Queensland. As part of the recovery program, the recovery team propagated a total of 378 *G. gonoclada* plants from seeds and cuttings collected from 17 trees. These were planted within patches of revegetation throughout south east Queensland over the following five years.

Threats to this endangered species include fire, flood, weeds and human disturbance, however myrtle rust has proven to be an additional unanticipated threat to *G. gonoclada* since the recovery plan was written. For the last 3 years, 100 of the propagated trees within 7 separate sites in Logan City have been monitored with a categorical scoring method to determine if differences in myrtle rust disease severity can be attributed to environmental conditions or host resistance.

Monitoring myrtle rust disease severity

A rating scale based on percentage diseased leaf area was modified from Pegg *et al.* (2014) and used to quantify myrtle rust disease severity during the 2013-16 growth seasons. Disease incidence and severity was found to vary within all sites. At each of the sites, a similar range of disease severity was observed among trees, with some individuals having high disease severity and others little to no visible disease symptoms. While the presence of resistance to myrtle rust in some *G. gonoclada* trees is positive, the potential loss of susceptible trees due to the disease is likely to negatively affect genetic diversity within such a small population. Additionally, some trees that have low disease incidence and severity on foliage had >90% infection incidence on flower buds. The adverse impact on flowering (fecundity) will further restrict *G. gonoclada*'s ability to regain genetic diversity within its population without considerable human intervention. *Gossia gonoclada* is known to produce new plants from root suckers, however, root and young epicormic shoots are often more susceptible to myrtle rust than the foliage on the main tree and thus do not necessarily contribute to recruitment.



Gossia gonoclada leaves infected with myrtle rust.
Photo: Tamara Taylor

Myrtle rust disease incidence and severity are influenced by environmental conditions. Environmental variables that influence disease development include temperature and humidity (overnight leaf wetness). A period of greater than six hours darkness combined with leaf wetness (rain or >90% humidity) are optimal conditions for the germination of spores on the leaf surface (Tessmann *et al.*, 2001). Epidemiology studies suggest that ideal overnight temperatures for spore germination range between 18°C and 22°C (Kriticos *et al.*, 2013). The seven *G. gonoclada* sites studied in Logan City are located within a 10 km radius and have been found to have very little variation in temperature, humidity or rainfall among them. The sites have ideal conditions for myrtle rust spore germination, with overnight relative humidity remaining predominately over 90% and overnight temperatures ranging from 17.4 to 20.5°C throughout the growing season of November to March each year.

Conservation strategies

We are encouraged that our study indicates that there might be some level of resistance to myrtle rust in *G. gonoclada*. Further work is underway to determine the genetic diversity among the study trees and the phenotypic characteristics that may influence host responses to myrtle rust. Leaf phenology data have been collected for the last 14 months to explore whether the timing of leaf production influences disease incidence for individual trees. Considering the constraints that myrtle rust poses to natural reproduction in *G. gonoclada* and the loss of genetic diversity, it is clear that this species requires continued, if not elevated, conservation effort. A propagation program focussing on resistant genotypes will need to be implemented to augment existing populations. Additionally, a complimentary strategy could focus on identifying suitable refugia to plant genetically diverse trees where environmental conditions are less suitable for myrtle rust.



Gossia gonoclada flower receptacle infected with myrtle rust (post-flowering). Photo: Tamara Taylor

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Holding on to Tea-tree fingers: a critically endangered fungus

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Tea-tree fingers monitoring project

Tea-tree fingers (*Hypocreopsis amplexans*) is one of the few fungi listed under conservation legislation in Australia. It was formally listed under the *Victorian Flora & Fauna Guarantee Act* in 2004, while still undescribed. In recent years, Tea-tree fingers has been reported infrequently. In 2016, funding from the Threatened Species Protection Initiative - Community Volunteer Action Grants program of the Victorian Government enabled Fungimap to develop survey protocols for rare fungi and carry out surveys specifically for Tea-tree fingers.

Fungimap

Fungimap is a national NGO dedicated to improving knowledge and conservation of Australian fungi. One of the main activities of Fungimap is a fungi mapping scheme which has accumulated more than 100,000 occurrence records of Australian macrofungi since inception in 1995. Verified records are supplied to the Atlas of Living Australia. While the focus of the mapping scheme has been on readily recognisable target species, most of which are common and widespread, some targets were deliberately chosen as being potentially rare or threatened.

Tea-tree fingers

Tea-tree fingers (*Hypocreopsis amplexans*) is an ascomycete fungus with a crust-like, lobed fruiting-body that clasps small branches. It is known from only three sites in Victoria, first discovered in the 1990s, and one site in *Nothofagus* forest in the South Island of New Zealand. The three sites in Victoria are within nature conservation reserves on the Mornington Peninsula and near-coastal west Gippsland, within 65 km radius. The Adams Creek Nature Conservation Reserve was created at least in part to conserve the fungus (May 1994). Much of the land



Tea-tree fingers fruit-body on dead wood. Photo: Tom May

around the known Victorian sites has been cleared of native vegetation and the Adams Creek site is surrounded by active sand mines. A 2013 sighting of a *Hypocreopsis* from New England National Park in New South Wales awaits identification on the basis of a fruit body sample.

Hypocreopsis amplexans was formally described in 2007, and the conspecificity of Australian and New Zealand collections confirmed from morphological and DNA sequence data (Johnston *et al.*, 2007). In Victoria, Tea-tree fingers is found on wood in long-unburnt heathy woodlands and Tea-tree thickets. It favours dead wood about 5 cm in diameter that is not yet lying on the ground. It appears to grow on another fungus, a resupinate (flat) member of the genus *Hymenochaete*, upon which it is assumed to be parasitic. Tea-tree fingers has been a Fungimap target species since 1999, but only 10 records have been received, confirming its rarity and restricted range.

Fungimap Records and Fungimap Conservation Databases

Records from the Fungimap mapping scheme are held in the Fungimap Records Database. Each record is at its simplest an observation of a particular fungus at a particular place and time, by a specific recorder. Some records also include substrate and habitat information, but rarely any indication of the number of individual fruit-bodies. In contrast, for rare and threatened fungi, 'rich' data is required for monitoring status and trends – more than just time and place. These rich data include: absence or 'zero' records (the fungus was searched for by someone who could identify it, but not found); estimation of survey effort (by time and area); microhabitat and substrate information; and counts and specific locations of individual fruit-bodies.

Given the sporadic and short-lived appearance of the fruit-bodies of many fungi, recording benefits from engagement with a network of recorders. This year, Fungimap produced a survey guide for Tea-tree fingers, along with data recording forms to trap rich data (available at: <http://fungimap.org.au/index.php/policy-development/seeking-sightings>). Four different survey forms were developed. The *Site sheet* logs known or potential sites, with precise details of the location and the area searched along with habitat and other relevant factors such as time since fire. The *Repeated search sheet* records information on the dates and survey intensity of visits to each specific site. The *Found sheet* records information on each fruit-body found, the exact location and details of the substrate. The *Photo monitor sheet* enables tracking of individual fruit-bodies over time, to establish longevity and reproductive status. The Fungimap Conservation Database was developed to store information on the sheets, linked to images such as fruit-bodies or maps.



Typical habitat for Tea-tree fingers in woodland in Victoria. Fruit-bodies occur most often on dead wood that is still partially upright. Photo: Sapphire McMullan-Fisher



The Adams Creek Nature Conservation Reserve near Nyora, one of only three sites for Tea-tree fingers in Australia. Note the adjacent sand-mining activity. Source: Google Maps.

2016 surveys for Tea-tree fingers

During 2016, talks about Tea-tree fingers were presented to a number of fungi-interest and conservation groups. Several surveys were carried out at known sites and other sites in the region with similar vegetation. These talks and surveys engaged various community groups and agencies including the Southern Peninsula Flora and Fauna Association, the Fungi Group of the Field Naturalists Club of Victoria, the Victorian National Parks Association, Main Creek Catchment Landcare Group, Parks Victoria and Royal Botanic Gardens Victoria, as well as individuals who had recorded the species in the past. Despite this increased survey effort, in 2016 only three fruit-bodies of Tea-tree fingers were discovered, all at one site (Grantville).

Obtaining 'rich' data through forms

A key lesson from the 2016 project is that as the complexity of survey forms increases, the motivation to complete the forms decreases, and some forms were only partially completed. While further education about the value of 'rich' data may assist; realistically, the forms have a necessary level of complexity that will remain a challenge for many recorders. In order to obtain the necessary data, there are two solutions. The first, which was utilised during the project, is to use interviews with observers to ensure completion of forms. This has the advantage of the interviewer being able to draw out additional information and clarify points.

Repeated Search Sheet						
Observers names (initials): <u>Joy Fisher</u>						
Group: <u>Fungimap</u>						
Contact Email: <u>info@fungimap.org.au</u>						
Date submitted: <u>1 December 2016</u>						
Regular Site Name: <u>Tea-tree Thicket North of Quarry</u>						
Date	Observers initials	No of observers	Time Observed (minutes)	Total search time (minutes)	Image (filenames)	Notes - (including altered site conditions or GPS file names)
16 June 2016	JD, VS	2	105	210		2 people searched 10-12 pm with 15 min break
16 June 2016	JF,	1	30	30		1 person searched for half an hour
30 Oct 2016	JF	1	20	20		One person searched for 20 min; GPX file SMF20161030_thicket_NorthQuarry
Regular Site Name: <u>Heathy Woodland from Quarry fence to the edge of the "Tea-tree Thicket North of Quarry"</u>						
Date	Observers initials	No of observers	Time Observed (minutes)	Total search time (minutes)	Image (filenames)	Notes - (including altered site conditions or GPS file names)
16 June 2016	JF,	1	10	10		One person searched for 10 min
30 Oct 2016	JF	1	20	20		One person searched for 20 min; GPX file SMF20161030_woodl edge of Quarry
Found sheet						
Recorder: <u>Joy Fisher</u>						
Photographers: <u>Joy Fisher</u>						
Group: <u>Fungimap</u>						
Date: <u>30 Oct 2016</u>						
If <i>Hypocrepopsis</i> or <i>Hymenochaete</i> IS found (see images on identification booklet):						
Observation of: <i>Hypocrepopsis amplexans</i>						
Site name -	Tea-tree Thicket North of Quarry					
Count the number of fruit bodies (on same substrate)	2 fruit bodies on the same branch, FB1 on ground and near the end of the branch, FB2 in middle of branch & above ground ~3 cm					
Record observations about the specimen. Does it look fresh, old, are there other fungi on the substrate? etc.	Two very old fruit bodies, dried up and thin, can't tell if it is from 2015 or 16 but looks old enough that it might be 2015. No obvious fruit bodies or mycelium of other fungi					
Associated Fungi: List any other fungi on the same substrate	No other fungi seen on the branch					
Substrate - Record the size, shape & general position of wood	Branch 3 cm diam. by 60 cm long, lying on the ground					
Substrate characteristics - (living, dead, with or without bark, plant host if possible)	On a fallen piece of what is probably <i>Leptospermum continentale</i> , based on the bark which is still attached					
Take GPS reading	S 38 19° 11.6', E 145 37° 20.1" altitude +/- 70 m					
GPS type, accuracy (meters) and datum if known	iphone +/- 3.6 m, Datum World Geodetic System of 1984 (WGS84)					
Please photograph each fruit body separately (filenames)	20160616_F1WPT85_HypocrepopsisFB1 & 20160616_F1WPT85_HypocrepopsisFB2 (FB = fruit body)					
Photos of the habitat.	Thicket of dense of <i>Metellicca squarrosa</i> and some <i>Leptospermum continentale</i>					

An example of the forms developed by Fungimap for recording occurrences of Tea-tree fingers and other rare and endangered fungi. The *Repeated search sheet* logs information about survey intensity for visits to each specific site. The *Found sheet* logs sightings, including the number of fruit-bodies observed and the precise location.

The four survey forms (*Site sheet*, *Repeated search sheet*, *Found sheet* and *Photo monitor sheet*) can be downloaded as one pdf: https://fungimap.org.au/images/public_files/2016_publicfiles/TTF_SurveyForms_v2.pdf

The second approach is to be realistic that 'rich' data recording is best carried out by a trained specialist. The ideal approach would be having a 'fungal ecologist' carry out field observations and monitor populations, whilst also being available to train and support a wider network of 'spotters'.

Actions

On the basis of the 2016 surveys, Tea-tree fingers appears to be Critically Endangered. Consequently, nominations should be prepared for the Commonwealth *Environment Protection and Biodiversity Conservation Act* and the IUCN Global Red List. The existing listing under the Victorian *FFG Act* should trigger creation of an Action Plan and implementation of a Recovery Team. Key issues that need to be addressed in the management of Tea-tree fingers include: the status of the New South Wales population; the most appropriate fire regime and indeed how the fungus re-establishes after fire in a fire-prone habitat; and the desirability and practicality of establishing an ex situ population (at least by isolation into pure culture or even by translocation of substrate + fungi).

Fungimap will continue to advocate for conservation of Tea-tree fingers and other rare and threatened fungi. Fungimap will also encourage recording of such fungi, by actively developing the Fungimap Conservation Database and the associated rare fungi survey forms, in order to more effectively monitor and manage populations of known rare fungi.

Acknowledgements

The State Government of Victoria provided funding that enabled the 2016 surveys and development of recording systems for Tea-tree fingers. We thank all the groups mentioned above and John Eichler, who discovered Tea-tree fingers in Victoria and has willingly shared his knowledge of it.

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Fontainea dude thinks he's a lady – recovery of the Coastal Fontainea and investigation into temporal monoecy

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Introduction

The Coastal Fontainea (*Fontainea oraria*: Euphorbiaceae) is probably the rarest rainforest tree in New South Wales (NSW) with a population of only ten wild mature plants and 52 seedlings. It is a small tree restricted to littoral rainforest remnants on basaltic soils at Lennox Head in north-east NSW. The plants are dioecious (separate male and female plants), and it was originally thought that there was only one female mature tree remaining. Eight of the mature plants are on private property and two on land managed by Ballina Shire Council. A conservation translocation program has been underway since 2010, which has included a component of ecological monitoring of the wild and translocated specimens.

Recovery program

Due to the critically low numbers, weed infestation of the habitat and issues with reduced genetic diversity, a range of recovery strategies were undertaken. These included bush regeneration, population monitoring, community awareness events and a conservation translocation program. We focus here on the conservation translocation aspects of recovery.

Translocation

A study by Rossetto *et al.* (2000) found that genetic diversity was substantially lower in seedlings than in the mature plants. This prompted a translocation program designed to promote genetic diversity. The program commenced in 2010 where cutting-grown plants representing each of the ten mature wild individuals were planted at a range of sites. Each cutting-grown plant was labelled with a unique code for monitoring purposes.

Translocation sites were chosen to include a variety of habitats and tenures. At each site, individuals of all mature wild Coastal Fontainea were planted in a circular arrangement to maximise cross-pollination opportunities between individuals (Figure 1). There are now 24 sites as well as sets of plants at Mt Annan Botanic Gardens and the National Botanic Gardens in Canberra



Figure 1. One of the Coastal Fontainea translocation planting sites. Coastal Fontainea can be seen in the foreground next to the star pickets. Photo: Dianne Brown

Monitoring

Ecological monitoring of all mature, wild Coastal Fontainea and individual translocated plants commenced in 2014. The monitoring focussed on recording flowering and fruiting events, any observations of pollinators and to assess seed production, viability and dispersal where possible. Monitoring was undertaken at fortnightly or monthly intervals and observations of flowering/fruiting and the sex of each flower was recorded.

Results

Flowers at translocation sites were first recorded in October 2014 on tree 421 at Site A and tree 324 at Site D (male). The first fruit were observed on translocated tree 401 at Site C in February 2015.

Figure 2 provides a summary of the number of flowering or fruiting events for all specimens grouped per plant type. Six of the ten plant types were always dioecious, two of these plants always being male, and four plants always being female. Of the remaining four plants, one plant (402) produced male flowers twice and female

flowers or fruits five times, and one predominantly male plant (324) produced fruit once. Tree 418 produced female flowers and fruits predominantly but small numbers of male flowers were also recorded on the same branch as female flowers (Figure 3). Tree 422 has only produced fruit once on a wild plant in June 2016.

The predominantly male individuals of 324 were recorded with male flowers a sum total of 72 times plus once with fruit, significantly higher than other males (all 21 times or less). The highest sum total for female individuals was 401 which produced female flowers or fruit 60 times.

The monitoring data for the wild plants show that seven of the ten trees produce female flowers only (Figure 4). Fruit have been produced on all these trees except tree 401, which has only produced fruit at the translocation sites. Two of the wild plants have always been recorded as male and one male tree (324) has produced flower buds but these have not been able to be sexed. Trees 402 and 422 have produced fruit once.

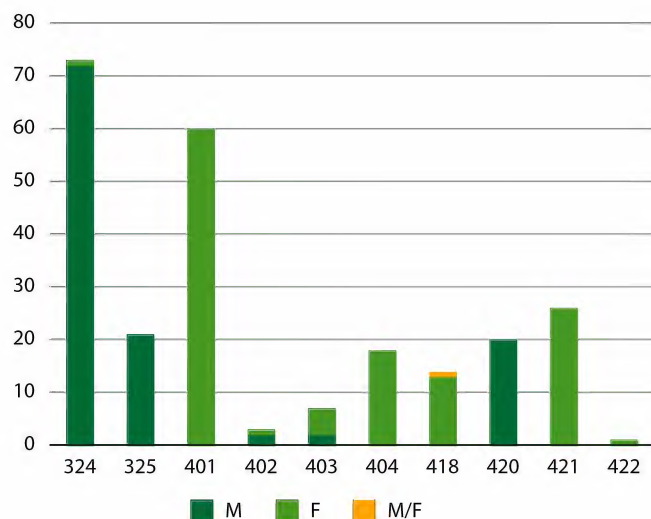


Figure 2. Summary of monitoring results (wild and translocated plants) showing the summed number of times each individual was recorded flowering or fruiting and the sex of each plant at each monitoring event.



Figure 3. Male and female flowers collected from the same branch of tree 418. Photo: Dianne Brown

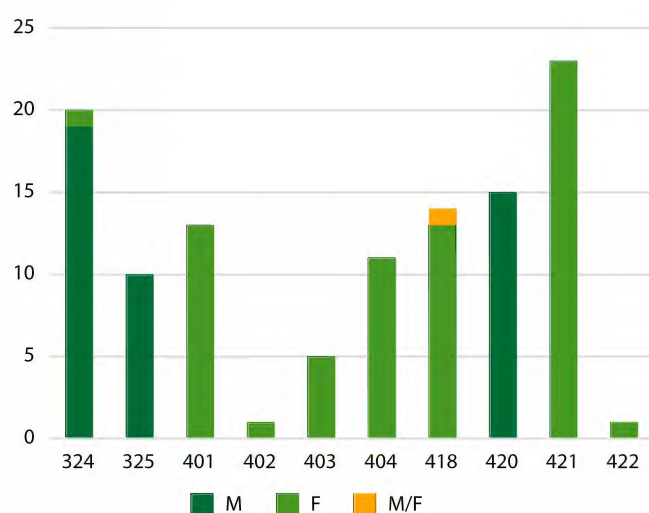


Figure 4. Summary of monitoring results (wild plants only) showing the summed number of times each individual flowered or fruited and the sex of each at each monitoring event

Discussion

Coastal *Fontainea* individuals appear to be either predominately male or predominately female and the male trees often produce a small number of female flowers. However, to date, only one female tree has been recorded as producing a male flower.

Tree 401 is separated from the main population of wild trees by approximately 800m. It was in poor condition and heavily shaded. Storms two years ago opened up the canopy and the condition of the tree has improved. It has since produced female flowers but no fruit. Interestingly, abundant and noticeably large fruit are regularly produced on translocated specimens of tree 401.

The wild tree 421 has regularly produced female flowers and fruit since approximately 1991 (NSW Dept Environment & Conservation (2003). Rossetto and McNally (2000) suggested there was dominance of certain genotypes in offspring production, which resulted in the loss of genetic diversity of seedling plants. Given the high incidence of flowering events of the wild specimen of tree 421 (Figure 4), it can be assumed that it was the parent plant that was contributing more than any other plant to the genetic pool of the seedlings. Interestingly, if the translocated specimens are included in this analysis, there may be an indication that individuals sourced from the isolated female tree 401 are now contributing more than tree 421 (Figure 2).

The most obvious outcomes of the Coastal *Fontainea* translocation program are an increased number of individuals and maximising the opportunity for pollen exchange to minimise risk of loss of genetic diversity. The program has also decreased the risk of extinction through stochastic events due to the increased number of Coastal *Fontainea* plants and the distribution of sites throughout the area.

There is an abundance of discussion in the literature regarding sex ratios of plants and its ecological and evolutionary consequences. Thompson and Barrett (1981) claim that dioecy functions as a mechanism to reduce inbreeding. However, unisexual breeding systems can be significantly and positively correlated with endangered species (Sjostrom and Gross 2006) and experience higher extinction rates and lower speciation rates compared with non-dioecious groups (Vamosi and Vamosi 2005).

Ongoing study of Coastal *Fontainea* will seek to clarify sex ratios across the population of wild and translocated specimens including further investigation of temporal patterns of sex ratios and the consequences for the ongoing viability of the species.

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Threatened species management on the rural-urban interface: insight from a critically endangered shrub

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Introduction

As urban development increases throughout rural areas around the world, habitat fragmentation and changes to disturbance regimes become ever-pressing issues for indigenous flora and fauna. Fragmentation impacts upon ecosystem processes; for example, it prevents gene flow, dispersal, and migration (particularly with climate change). It also can dramatically alter top-down or bottom-up ecological processes, promote competition from invasive species and alter fire behaviour. Fire is a major disturbance factor across the globe, and particularly for Australian vegetation. The expansion of urban development can lead to reduced fire frequency through fire exclusion and suppression around residential areas, or can increase the frequency of fire through fuel-reduction burns or unintended ignitions; both can have dramatic effects on the type of species able

to persist in these areas. Further, travelling with the expanding urban boundaries are concomitant suites of native and introduced urbanophile species that threaten to compete with, and displace, locally indigenous taxa (McKinney, 2006).

Habitat fragmentation and changes to disturbance regimes can place great pressure on geographically restricted, rare, endemic species. For example, of 148 plant taxa listed as critically endangered under the Commonwealth *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* (Australian Government 2016), 45% specifically include future development and land clearing (habitat loss and / or isolation of small remnant populations) as threats to populations, and 52% include altered fire regimes (11% specifically from increased fire frequency, and 3% from decreased frequency).

Insight from a critically endangered shrub

In a recent study (Patykowski *et al.*, 2016), we examined the likely influence of habitat fragmentation and reduced fire frequency on the decline of Round-leaf Pomaderris (*Pomaderris vacciniifolia* Reissek), a shrub listed as critically endangered under the EPBC Act 1999. Populations of this species are predominantly found at the rural-urban interface of eastern Melbourne, in south-east Australia. We found that its seeds require a heat treatment consistent with the effects of fire for mass-germination events. Although a small proportion of its seed can germinate in the absence of fire, it is likely that competition from both native and exotic species has led to remaining populations of this species declining between major bushfires in 1926, 1939 and 2009. Furthermore, we found that seeds typically disperse less than 1 m from the parent plant, and thus migration through suitable habitat is probably limited by fragmentation from agriculture, roads and other rural infrastructure. The longevity of seeds in the soil seed bank is unknown, but it can be concluded that in the long-term absence of suitable recruitment events (fire), and eventual depletion of the soil seed bank, local extinction of this species will occur and populations are unlikely to be replaced.

Management options

Ecological burning is an option for ensuring the persistence of this species, although controlled burns have inherent planning limitations when applied to bushland amongst areas with mixed residential and primary production use (Gill and Scott, 2009). Collecting seed and planting greenhouse-grown seedlings in suitable areas is a viable but potentially expensive, labour-intensive option. Determining what



Inflorescence of Round-Leaf Pomaderris (*Pomaderris vacciniifolia*).
Photo: John Patykowski



Roadside population of Round-Leaf Pomaderris (*Pomaderris vacciniifolia*) in the peri-urban town of Toolangi, Victoria.
Photo: John Patykowski

a suitable area is requires further research. One could model suitable habitat under climate change scenarios then plant tubestock or distribute seed into these areas, where ecological burning could be undertaken in the future. This would aim to shift its distribution into more remote areas, and may give it greater conservation security. A myriad of factors need to be considered under this management regime including competition with other species and other general effects on ecosystem processes within the recipient sites.

As a case study, this species highlights the broader challenge we face when dealing with threatened species that are predominantly distributed around urban-fringe areas. Species-specific management is one option, but what of the species we don't realise are threatened? Multi-species approaches may be a better option, and this comes down to effective strategic planning and strengthening the prominence of rare and threatened species management in Victorian Planning Provisions. Maintenance of connectivity between 'green-wedge' zones around Melbourne, and maintenance of disturbance regimes can ensure vegetation does not become ecologically degraded and species-poor. Furthermore, it can help to ensure that other ecosystem attributes are maintained, such as structure which is important for different trophic levels.

Conclusion

With increased pressure for alterations to vegetation for fire management, access, and residential growth, so too does the urgency with which we must plan for managing vulnerable, endemic species. Species such as Round-leaf Pomaderris can highlight the precarious nature of managing small populations of threatened species, how quickly they can respond when suitable disturbance regimes return, and how little we understand regarding the potential of other species to be in a similar precarious position; unbeknownst to scientists, land managers and the wider public.

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Parks and people: Promoting plant conservation

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'Plant blindness'

Are we really 'blind' to plants? [theconversation.com/people-are-blind-to-plants-and-thats-bad-news-for-conservation-65240 and online in *Conservation Biology* DOI: 10.1111/cobi.12738]. This interesting piece by Balding and Williams from the School of Ecosystem and Forest Sciences, University of Melbourne discusses how frequently plant conservation initiatives slip under the radar in favour of animal projects. But this is nothing new, we've known about this shortage of interest in plants for a long time. It goes hand-in-hand with a shortage of funds for plant conservation projects relative to that allocated for animal conservation. Why is this? Are animals inherently more interesting? Is it because they are more elusive? Is it because they are considered 'cute and cuddly' and we can relate to domestic pets and a sense of nurturing? Or is it because we don't try hard enough to promote the good work being done in plant conservation?

Conservation actions for threatened plants in Australia include legislation, policies and legal controls, land protection, and specific *in situ* species management

activities such as fencing and invasive species control, both pest and disease. *Ex situ* methods are also employed, including seed banking, maintaining living collections in botanic gardens and the deliberate transfer of material from one site to another in order to reinstate or augment declining or lost resources (termed *translocation*). These translocations are used by conservationists as a tool in worse case scenarios, when *in situ* management is just not enough to halt the loss of plant genetic diversity. In Western Australia, translocations are widely used in conjunction with seed banking to ensure that critically endangered plant species are given the opportunity for a safe future away from threatening processes such as *Phytophthora* dieback disease.

Because translocations are such a 'desperate' measure to prevent extinction, they should be used to help inspire a public sense of optimism in the face of biodiversity loss. They present a good opportunity to promote important plant conservation efforts. However, plant conservation activities in WA often suffer from a low public profile and a lack of media attention compared with the attention that animal projects receive. Indeed, a recent article in the



December 2010 and interpretive signage. Photos: Anne Cochrane

West Australian newspaper ('Under threat' 30 Aug 2016) profiled 10 of WA's most endangered animal and plant species, however only one plant species was mentioned, and this in a State where there are more than 3 times as many critically endangered plants as animals!

So how do we reverse this cycle of apathy in plant conservation? How do we get media attention? Should we be trying harder at all levels, from community to government, to celebrate and interpret the science we do that supports the survival of plants in the wild? The ANPC's *Australasian Plant Conservation* bulletin is a great conduit for this but how large is its readership?

In an attempt to support the outstanding conservation work being done to safeguard one of WA's most threatened wattles, we aimed to promote and interpret a translocation site that would normally be hidden to the public behind closed doors to keep details of locations confidential.

The Stirling Range wattle

The critically endangered *Acacia awestoniana* (Stirling Range wattle) from the species-rich Stirling Range National Park in WA's South West is known from only two small populations in *Eucalyptus wandoo* woodland. This tall spreading shrub is an obligate seeder, killed by fire and totally reliant on recruitment from seed for persistence in the landscape. A wild fire in 2006 destroyed the majority of adult plants in the largest population. Poor regeneration and native animal grazing impacted on new seedlings causing a sharp decline in the populations' prospects for long-term survival. Fortunately, since 1994 more than 25,000 seeds representing a broad diversity of plants had been collected and conserved in the Department of Parks and Wildlife's (DPAW) Threatened Flora Seed Centre in Perth as insurance against plant loss in the wild. In 2010 this 'insurance policy' was put to good use when seed was retrieved from the 'bank' to support species recovery.

The project became part of a University of Western Australia (UWA) PhD study (student Christine Allen) in collaboration with DPAW staff, Sarah Barrett and Rebecca Dillon. The site chosen for the plantings was adjacent to a private eco-tourism accommodation facility just outside the Park, and less than 100 m from the second smaller population of wild plants. The proximity to the accommodation and wildflower tours held in the area suggested a potential for conflict with conservation through trampling of seedlings, introduction of disease and taking of plant material for private or commercial purposes. Such translocation projects are normally hidden away from the public eye, in an effort to protect the species and any infrastructure established on site.

The project was supported by the Albany Threatened Flora Recovery team and a project plan was drawn up with detailed impact evaluation checklist, *Phytophthora* hygiene plan, path layout, and draft wording for



Flowering *Acacia awestoniana* and seed collection Dec 2015.
Photos: Anne Cochrane

interpretive signage. The department's corporate relations staff, rangers and managers were consulted prior to approval of a work request form, before a suitable contractor was identified to do the work. A path and fenced demonstration plot were constructed adjacent to the translocation site and five signs produced. The interpretive side of the project was done in sequence with the planting and fencing of the new seedlings in 2010 to maximise public engagement.

Providing an opportunity for the public to interact with some of our most threatened plant species is just the beginning, though there are issues in not knowing the exact impact of the project on raising public interest in plant conservation. There are no counters on the pathway and no cameras to provide data on how many people have read the interpretive signage. There is no way to gauge public reaction to the translocation, other than through word of mouth and comments left in visitors books at the accommodation facility and the rangers' station. However, by the end of 2015 some three-quarters of the seedlings had survived and seed collections had been made from the now adult plants for assessment of viability and research into soil seed bank longevity. This is a great outcome in its own right.

Conclusions

Since 1998 more than 60 WA threatened plant species have been translocated to new locations in the wild. The numbers of threatened plant species requiring translocation as a conservation measure are rising, providing the opportunity for further such interpretive efforts. The pressure on these 'at-risk' species is increasing exponentially. Improving public understanding of conservation issues and government responses, including research actions that aim to assist wild plant conservation, ought to enhance people's awareness and appreciation of WA's natural heritage and the sometimes seemingly insurmountable issues involved in its conservation. Plants are static in space, so we don't have to wait for

nightfall with a head torch to see them. Consequently, we should be able to create easily accessible and interesting interpretation, particularly in high profile areas such as national parks. It's important to promote opportunities for people to connect with plants and to foster their interest in plant conservation projects. However, we still wonder why a large section of society does not recognise the importance of plants and place animals in a superior position. Animals cannot exist without plants that provide both food and habitat. The question remains though, how do we effectively raise interest in plant conservation activities? What we do know is that we need to encourage more communication and do it in such a way that it engenders interest and passion for plant conservation.

New approaches to plant conservation challenges. Conservation for people and nature, benefiting both. Reflecting on FOG's experience, learning and vision

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New approaches to conservation

The central theme of the conference is '*New approaches to plant conservation*' and the sub-theme I am addressing is *how does conservation effort benefit both nature and people?* While our past achievements are many, it is timely to reassess our approaches, refine our visions and strategies, and to move forward. I have been considering these questions for some time, as I have been attempting to complete a history of the *first twenty years of Friends of Grasslands (FOG)*, reflecting on FOG's experience, learning and vision.

What is FOG?

FOG is a community not-for-profit association that was launched in November 1994 to support *natural temperate grasslands*, that is, naturally treeless areas dominated by a diversity of native grasses and forbs. Later FOG broadened its scope to include *grassy woodlands*, areas dominated by scattered trees and shrubs with a diverse understory of native grasses and forbs. These communities, once extensive in south-east Australia, now occupy less than five percent of their area at the time of settlement/invasion.

FOG was established in Canberra but quickly established a presence in the Southern Tablelands of NSW, and moving further afield it has led many field trips to areas of NSW, Victoria, Tasmania and South Australia, and supported efforts in these areas through its advocacy and publicity.



Old Cooma Common Working Bee. Photo: Geoff Robertson

A science-based initiative

The creation of FOG was a science-based initiative and the story of its creation is still highly relevant. A number of scientists (botanists, herpetologists, entomologists and ecologists) began to focus on the demise of grassy ecosystems. A few individuals took it upon themselves to organise conferences and to lobby both government and the community to create, support and fund community involvement in grassy ecosystem conservation. FOG was born. The focus was based on an ecosystem, rather than individual species, approach. The vision sought to bring about a partnership between scientists, landowners, land managers and conservation-minded individuals, and to form an organisation based on mutual respect and learning. Important principles adopted from the get-go were adaptive-management, evidence-based (scientific) decision-making, and respect for the beliefs of all stakeholders.

FOG strategies

FOG strategies, present from the beginning but also evolving over time, include organising events such as conferences, workshops and presentations to other groups, field trips to grassland and woodland sites, working bees restoring sites, and flora and fauna surveys. Advocacy, important from the start, has remained a strength. Telling the grassland story in a compelling but simple way through its respected *News of Friends of Grassland* has been a constant. FOG has also published the high quality *Woodland Flora*, and various conference proceedings. Its website is frequently visited. FOG has regularly sought media coverage of its events. It has put a strong emphasis on building networks with like-minded groups and individuals and on developing its governance and finance structures. This model remains highly relevant.

Some key examples

Each area of FOG's diverse range of activities has met with success:

- FOG on-ground work - well organised, innovative, community-government partnership.
- Plant and fauna surveys - valuable citizen science, data and management outcomes and community involvement.
- Conferences and workshops - training, education and exchange of knowledge.
- Field trips - the wow factor, networks and management outcomes.
- Publications - quality, building communities and knowledge, story telling.
- Media coverage - getting ideas out there.
- Advocacy - highly respected, evidence-based, non-confrontational, good outcomes.



Planning FOG workshop on Aboriginal values.
Photo: Geoff Robertson

- Governance and finance - sustainable structures and funding, government financed projects.
- Offshoots - many copycats, FOG co-created Southern Tablelands Ecosystem Park, a regional botanic garden and restoration centre.
- Building networks - to influence and learn from others.

Some statistics

During the period 1994-2014, FOG organised 1,193 activities (events, field trips, working bees and surveys, publications, submissions, etc.). This involved 1,400 presentations (at conferences, workshops, field trips etc.) and 65,000 volunteer hours. Its efforts are conservatively valued at \$1.8 million.

Achievements in grassland conservation

FOG has been involved in and/or promoted many grassland achievements:

- Grassland sites - mapping (pre-1788 & current), documentation and conservation management.
- Landscape planning - urban areas and grassland reserves now exist side-by-side.
- Grazing and conservation - grazing not incompatible with grasslands conservation.
- Grassland science - on-going research, citizen science and monitoring, grassland function and restoration ecology.
- Evidence-based science acceptance in advocacy and policy.
- Seeds and plants - big steps forward in using grasses and forbs in pastures, horticulture, roadside vegetation and restoration.
- Weed technology - refinement of techniques, e.g. new tools, trialing low dosage boom spraying.
- Captive breeding and release programs.

- Traditional aboriginal land management practices - recognition and gradual introduction.
- Volunteer groups and extension services supporting grassy ecosystems proliferating.

Rewards for participants in conservation

There are many rewards for participants in grassland conservation:

- Discovery of beauty, intricacy, complexity and behaviour of individual species.
- Discovery of the interrelationships between species and between species and habitats.
- A sense of connectedness with nature - nature as teacher, belonging to Country.
- A sense of achievement when one's campaigns, lobbying, experiments, research and on-ground work comes to fruition.
- Strengthening of values - valuing of landscapes, vegetation, flora and fauna, spiritual connection with First Australians.
- Learning new skills and developing self-worth.
- Friendships with fellow self-discoverers.
- Life achievement, mentoring, passing on knowledge and experience.

Aspirations of community groups

Community organisations play an essential role in a democratic society, and provide essential economic, social and environment services. They offer alternative models of values and organisation. The activity of volunteering is a great source of individual wellbeing.

The hallmark of a successful community group is each member contributing his or her knowledge and skills and respecting and learning from fellow members.

Mutual respect and egalitarianism are essential - the contribution of scientist and non-scientist and employee and volunteer should be equally valued. Also essential are balancing goal-setting with effort, attaining sound governance and finance practice, decision-making, delegation, creating careers and training for volunteers. These are aspirations but they should never be lost sight of.

Achievements and shortcomings

There have been tremendous achievements: grassland remnants have been saved and managed; advancements in biodiversity science and conservation management; trialling of techniques; greater community involvement; and telling good stories of these successes.

Nevertheless, biodiversity has fallen off the national agenda. Biodiversity along with government funding, philanthropy and volunteering efforts is declining. The world is dumbing down.

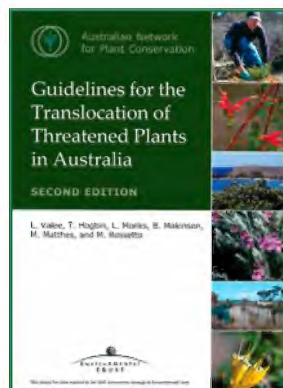
Challenges

As individuals I believe we should challenge those values within us that make us feel powerless, fearful, under value our contribution, unable to speak up and deny our generous instincts. We should undertake to equip ourselves better (learn skills, get training, stretch ourselves) to make our contribution more effective. Change and philanthropy begin with us.

As groups, we should ask how can we use our people and resources effectively? Balance goal-setting and effort? Be less risk-averse? Stretch ourselves further? Trust each other more? Find alliances? Identify and recruit people whose skills we need? and so on.

We need to appeal to mainstream culture.

Where do we find individuals and groups to be our role models? Look around the room.



Guidelines for the Translocation of Threatened Plants in Australia

The deliberate transfer of plants or regenerative plant material from one place to another (eg re-introduction, introduction, re-stocking).

Second Edition 2004 | L. Vallee, T. Hogbin, L. Monks, B. Makinson, M. Matthes and M. Rossetto
Australian Network for Plant Conservation, Canberra.

For more information and to order, go to <http://www.anpc.asn.au/translocation>

Effect of fire and digestion by herbivores on seeds of the exotic invasive species *Acacia nilotica* in savanna at Baluran National Park Indonesia

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Introduction

Acacia nilotica is abundant in Africa but has been scantily studied in relation to savanna ecology. In Australia, a study by Radford *et al.* (2001), acknowledged that *A. nilotica* has negative impacts on savannas. *A. nilotica* can be threatening to savannas as its adult trees are apparently fire tolerant and can form thorny thickets. *Acacia nilotica* was introduced into *Zizyphus rotundifolia* savanna in Baluran National Park, East Java, Indonesia in the late 1960s, where its original purpose was to create fire breaks to prevent fire spreading from savanna to the adjacent teak forest. However, *A. nilotica* has spread rapidly and is threatening the existence of savanna in Baluran National Park, as it has been observed to change the ecosystem from open savanna to a closed canopy of *A. nilotica* in some areas (Figure 1) (Sutomo *et al.*, 2016). There has been a lack of empirical studies on the cause and extent of the spread of *A. nilotica* in the Baluran savanna. We propose an hypotheses that fire and grazing by the introduced water buffalo (*Buballus* sp.) play an important role in the establishment of *A. nilotica*.



Figure 1 . *Acacia nilotica* stand at study site in Baluran National Park, East Java, Indonesia. Photo: Sutomo

Method

Baluran National Park is located in East Java Province, Indonesia (Figure 2).

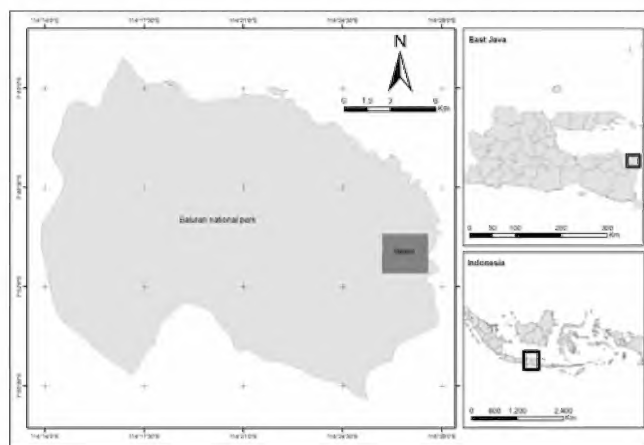


Figure 2. Location of Baluran National Park and *Zizyphus rotundifolia* (local name *bekol*) savanna within the national park.

Field sampling employed nested plots, and vegetation data and buffalo dung were collected. Seeds were extracted from dung (Figure 3) and also collected from parent trees (extracted from their pods). In this experiment, fire effect was investigated by oven heating seeds, whereas grazing effect was investigated by germination of seeds extracted from buffalo dung. A 2x2 complete factorial laboratory experiment arranged in a completely randomised block design with 3 blocks as replications were carried out in the Seeds Laboratory, Bali Botanic Garden. The first factor was fire with 2 levels: not heated (F0) and heated in oven at a temperature of 105 °C for 5 minutes (F1) The second factor was herbivory with 2 levels: seed extracted from dry pods (H0) and seed collected from dung (H1). Therefore, there were 4 treatment combinations, namely F0H0, F0H1, F1H0, and F1H1. Experimental units were 10 seeds of each treatment, placed in 10 cm diameter Petri dishes lined with tissue paper watered with tap water.

Regular rewatering occurred as required during the course of the experiment.

In order to observe seed imbibitions, each seed in each experimental unit was weighed with an Ohaus Pioneer PA-2102 electronic scale starting at the treatment application, at 1 – 2 day(s) intervals until the end of the experiment. Seed which germinated was counted and removed from the Petri dish. By the end of the germination test, there were two kinds of count data: counts of imbibed seed – permeable seed which germinated, therefore viable (PV) and counts of permeable seed which did not germinate, therefore non-viable (PN). The seeds which did not imbibe, namely those with a hard seed coat, were then scarified by cutting the seed coat at an area opposite the radicle with a sharp nail clipper. These seeds were then tested for their viability by employing the tetrazolium (TZ) test. The results of the TZ test were count data of impermeable seeds which were viable (IV) and impermeable seeds which were non-viable (IN). These count data of PV, PN, IV and IN were square root transformed ($\sqrt{x+0.5}$), then subjected to analysis of variance (ANOVA) and Duncan-test.



Figure 3. *Acacia nilotica* seeds inside buffalo dung, in Baluran National Park, East Java, Indonesia. Photo: Sutomo

Results and Discussion

The ANOVAs revealed that the treatment effect was significant only for PV and IN. According to the Duncan test, fire significantly reduces permeable seed viability and the same is also relevant for herbivory (Table 1). On the other hand, although there is a significant increase in seed non-viability for hard seeds due to exposure to fire, the number of hard seeds which are non-viable following herbivory is significantly less than that of without herbivory (Table 1). In this case, the interaction between fire and herbivory on IN is significant (Table 2). From our results, it can be seen that generally fire has a detrimental effect on seed viability. Although it is not significant based on Duncan test, there is a tendency of increase in the percentage of viability of impermeable seed due to herbivory. Dung seems to protect seeds from the detrimental effects of fire.

Table 1. Table of Main Effect, Percentage of Seeds which are permeable & viable (PV), permeable & non-viable (PN), impermeable & viable (IV), and impermeable & non-viable

Treatment	PV		PN		IV		IN	
F0	13.3	a	18.3	a	61.7	a	6.7	b
F1	3.3	b	33.3	a	40.0	b	23.3	a
H0	13.3	a	18.3	a	43.3	a	25.0	a
H1	3.3	b	33.3	a	58.3	a	5.0	b

Remarks: n = 10, in the same column, values followed by the same letter are not significantly different (Duncan-test $\alpha = 5\%$)

Table 2. Table of Simple Effect, Percentage of Seeds which are permeable & viable (PV), permeable & non-viable (PN), impermeable & viable (IV), and impermeable & non-viable

Treatment	PV		PN		IV		IN	
F0H0	20.0	a	16.7	b	53.0	ab	10.0	b
F0H1	6.7	ab	20.0	ab	70.0	ab	3.0	b
F1H0	6.8	ab	20.1	ab	33.3	b	40.0	a
F1H1	0.0	b	46.7	a	46.7	ab	6.7	b

Remarks: n = 10, in the same column, values followed by the same letter are not significantly different (Duncan-test $\alpha = 5\%$)

Our findings show that in general, fire has a detrimental effect on seed viability. However, dung seems to protect seeds from the detrimental effect of fire. This result suggested that buffalo grazing and ingestion of seed might not result in scarification sufficient to increase the total number of seeds which germinate; fire may have played this role but limited to those seeds with an additional protective layer such as buffalo dung. Buffalo dung provides protection which prevents overheating from fire damaging the seed.

These results confirmed the importance of understanding seed biology and other characteristics of invasive alien species (IAS) in native ecosystems and also confirmed the important role of seed dispersal through animal digestive systems (Calvino-Cancela and Rubido-Bará 2012). Understanding seed biology and characteristics of IAS in native communities is important in drafting management plans for invaded ecosystems (Vieira and Scariot 2006) especially when preparing for a restoration program.

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News from the Australian Seedbank Partnership

A thankyou note to our volunteers from the South Australian Seed Conservation Centre

J.R. GUERIN* AND D.J. DUVAL

South Australian Seed Conservation Centre, Botanic Gardens of South Australia, SA

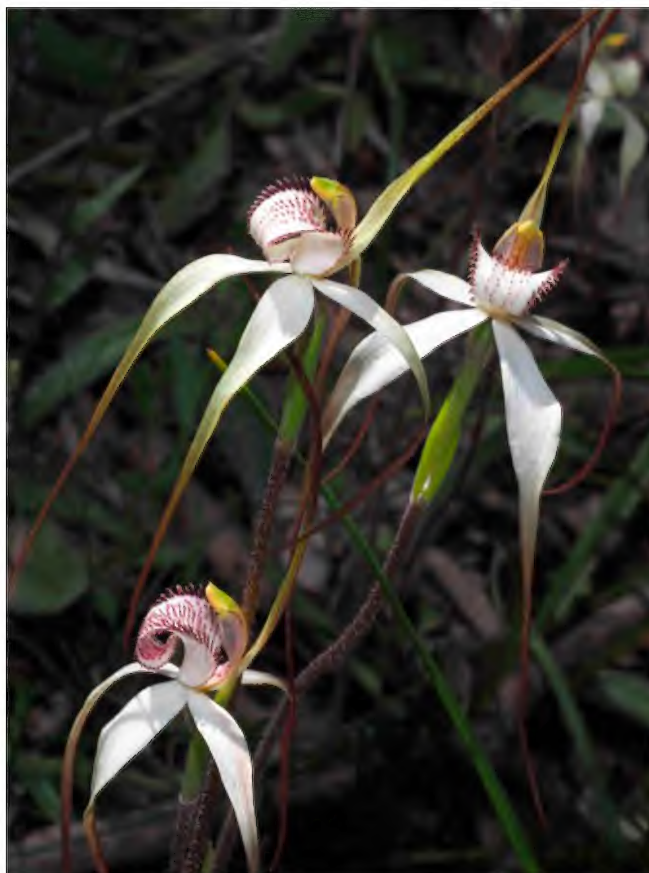
*Email: Jenny.Guerin@sa.gov.au

It is midway through the seed collection season and we have barely had time to welcome Dr Lucy Sutherland in her new role as director of the Botanic Gardens of South Australia. Having known Lucy in her previous role as the coordinator of the Australian Seed Bank Partnership, we were thrilled to see her accept the appointment. Lucy joined us for a field trip to Kangaroo Island last year and we hope to lure her out again, when she is not too busy. This season we have been on several seed collecting trips for a variety of projects, travelling across the state to Innamincka Regional Reserve, Witjira National Park, Kangaroo Island, Eyre Peninsula and a few stops in between. Areas like the Moon Plain and Strzelecki Desert were still green after high rainfall through winter and spring, and there seems to be more opportunities to collect seed than we have seen for many years. Thankfully, we have a team of volunteers that are always ready to join us in the field and work hard.

As well as seed collection, we gather images and information for the Seeds of South Australia website (www.saseedbank.com.au). The website was initiated by Thai Te, as an online resource designed to provide information and images from field work and laboratory studies conducted by the South Australian Seed Centre since 2003, and was generated in response to a seemingly constant demand for fact sheets about plants. The site has developed over the last few years and now has more than 15,000 images for over 2,570 species. It's a way of keeping our images and data organised, and making it accessible to the public as germination data and plant images are of little use buried in hard drives and notebooks. The website has been useful for generating reports and answering queries about plants. Although it must be noted that we now have many more queries about seeds and plants, surprisingly many from international researchers asking permission to use our images or seeds for their research. Thai continues to volunteer at the Seed Centre and regularly contributes to the web page. He has made a reference collection containing samples of seeds from all the species collected, which has greatly facilitated the process of imaging all the seeds.

The website has developed steadily over the last few years, largely through the enthusiasm and dedication of key volunteers and associates. Rex Croft does the coding for the website and has implemented several

useful features, including links to the Australian Virtual Herbarium for each species to view the distribution of plant records across Australia. He has also added the regional species conservation assessments per IBRA subregion as a colour-coded regional map. The maps sum up a lot of information – where a plant species has been recorded, areas of least concern, areas at edge of range, and areas where it is most threatened. The threats are listed in a table displaying the notes from the conservation assessments. Rex has also linked to the Flora of South Australia 5th Edition, but has converted the information from PDF format to an interactive web-based format with immediate access to glossary terms and plant identification keys. Rex has years of experience processing biological data, and always has a thoughtful interpretation of what we propose to add to the website.



Caladenia argocalla flowers. Photo: David Kilpin



Thai Te collecting seed. Photo: South Australian Seed Conservation Centre

Other volunteers that have made a major contribution are Denzel Murfet and Rosemary Taplin. Denzel has helped with field work for the Centre for many years, is a highly accomplished field botanist and regularly takes photos of plants and uploads them on the website. Rosemary is the expert on grass identification in the state and is helping with annotating images of grass seeds to show distinguishing features for species identification. David Kilpin, a more recent volunteer, is now using the microscope to take seed images.

We met David through a threatened orchid project we started that is also largely supported by dedicated volunteers. David owns a property with a population of *Caladenia argocalla*, a nationally endangered orchid that was identified as one of five orchid species that are targets in the Mount Lofty Region for *in vitro* propagation. The project was initiated through another volunteer, Kieran Brewer, who has made many seed collections for the seed bank, and we frequently draw on his extensive knowledge of flora in the Mount Lofty and Flinders Ranges. Kieran emphasised the need to get started on propagating some of the orchids from populations he has been watching diminish over the years. We have since been working with students from Kildare College and their endlessly enthusiastic teacher Paul Beltrame to propagate these orchids for reintroduction. We are working in partnership with Dr Noushka Reiter from the Royal Botanic Gardens Victoria's Orchid Conservation

Program for this project. Noushka has isolated the associated mycorrhizal fungi from the orchids and we have sent seed for germination and propagation to the laboratory at the gardens. She has since sent fungal isolates back that we have used with the students to propagate young plants of *Caladenia argocalla* and *Thelymitra cyanapicata*. This project also involves volunteers from the Native Orchid Society of South Australia such as Thelma Bridle and Les Nesbitt, who have given their time, knowledge and expertise in assisting the work. This involves hand-pollination of orchids, monitoring pod development, harvesting seeds and invaluable advice on propagation techniques.

There are many more people we would like to thank that have volunteered over the years and through their skills and motivation have made our extended programs such as the web site and the orchid propagation project possible. We currently have 72% of the State's threatened flora in our long-term storage facility and that would not have been achieved without the help of volunteers. Throughout the seed conservation program volunteers have found plant species that were thought be extinct, made records of species that are new to the state and recorded undescribed plant species. The consistently high standards and work ethic of our volunteers is very motivating for staff at the Seed Centre, and help to create a vibrant and dynamic work environment.

ANPC Member Profile

DOUG BICKERTON

What is your current role?

My title is Threatened Species Policy Officer, with South Australia's Department of Environment, Water and Natural Resources. This is a broad ranging role, working in a small team with responsibilities such as:

- delivering advice to Executive and the Minister on threatened species matters,
- advising and coordinating advice on listings under the EPBC Act
- assisting with the review of threatened species listings under state legislation
- advising, assisting and / or chairing recovery teams where needed.

My workload mainly concerns threatened flora, but I also deal with a substantial number of fauna and ecological community issues.

What projects are you working on at the moment?

Some of the business that currently keeps me smiling includes:

- helping one of our regional threatened flora project officers to collate and analyse years of orchid monitoring data, so we can re-evaluate and re-focus the monitoring programme
- working with the Spiny Daisy (*Acanthocladium dockeri*) Recovery Team to draft a chapter for a book, currently being compiled with National Environmental Scientific Programme (NESP) funding, that aims to capture successes in the realm of threatened species recovery
- working with project officers to develop improved training opportunities for volunteers involved in threatened flora surveys and monitoring
- contributing to SA's multi-agency State Buffel Grass Taskforce, which aims to reduce in South Australia the distribution and impacts of one of Australia's worst arid-land weeds
- working with e-NGO Trees For Life to organise an ANPC workshop in SA, on the topic of 'provenance'
- Compiling a report on the risk assessment of the little penguin (*Eudyptula minor*) population in South Australia.

How did you end up working in plant conservation?

I've always enjoyed bush walking and had an interest in plants, but I did come to work in this field later than most. For many years I worked as a landscape gardener, and one of my regular clients lived on a bush block in the Adelaide Hills. She loved to show me one section of her property where the orchids flowered prolifically.



Doug Bickerton (right) with Yankunytjatjara elder Sammy Dodd in the remote APY Lands, north western SA, admiring the rare Everard garland lily (*Calostemma abdicatum*). Photo: Doug Bickerton

These visits inspired me to think differently about the natural world and my relationship with plants, and eventually I decided on a career change, starting with a Master's degree in plant ecology.

How long have you been involved with the ANPC?

I've been a member for more than five years, and for most of that time I've been on the committee. I consider the ANPC to be Australia's foremost organisation for plant conservation, promoting and disseminating information relating to technological advances, guidelines and policy.

Is there anything else you would like to talk about...

Actually, yes, did I mention....

In 2015 my wife and I decided to take leave from our comfortable Adelaide lifestyle, to live in an aboriginal community in the Kimberley for 12 months. My wife worked as a dialysis nurse in Fitzroy Crossing, and I picked up casual work at the hospital, and at the school.

During my daily walks I collected plant specimens and started up my own herbarium, to learn about the local vegetation. And the bird life was amazing. We made the best use of our time and went exploring and camping whenever the opportunity arose, visiting the Bungle Bungle, the Gibb River Road, Windjana Gorge, Mitchell Plateau etc.

While in the neighbourhood, I took the opportunity to volunteer for a northern quoll survey with Parks and Wildlife staff in the King Leopold Ranges National Park, visiting areas not accessible to the public. I was also fortunate to join a field trip with indigenous Ngurrara Rangers into the Great Sandy Desert, surveying for bilbies and learning about some of the plants that the Walmajarri people see as important for medicine or food, as well as sharing with them stories of some of the field work I've done in parts of SA.

It's never too late to step outside of your comfort zone.

Book reviews

Wildlife Conservation in Farm Landscapes

By David Lindenmayer, Damian Michael, Mason Crane, Sachiko Okada, Daniel Florance, Philip Barton and Karen Ikin.

CSIRO Publishing, Clayton South

2016 232pp ISBN 978148303106 paperback \$49.95

Biodiversity is everywhere. The proportion of the landscape which is in formal conservation reserves, although it has risen over the years, is small. Reserves play a vital role in conservation of biodiversity; they are the jewels in the crown, but, absent the metal, the remaining heap of stones would have less value and the form and function of the crown would have been lost. The future of much biodiversity requires that the crown remain intact and conservation must be a responsibility of all landholders. If we are to believe some sections of the media, we might think the conservation and agriculture are incompatible, but this has never been the case, and for our common future, we must hope that it is not a view that becomes embedded in public and government opinion.

Conservation and maintenance of biodiversity need not be a burden upon primary producers, and indeed can be a positive benefit. This is been recognised by many landholders from long before the term biodiversity was coined and landholder concern is reflected in the strength of the Landcare movement.

For many years David Lindenmayer and his group at the Australian National University have had a major focus on research in agricultural landscapes, particularly in south-eastern Australia. As the authors write in the Preface they "feel a sense of duty to communicate" the findings of their research "to the many farmers, catchment managers, revegetation practitioners and others with whom we have worked". This object is more than achieved – but the book is relevant to more than its primary audience, and will be of value to students and to the many urban dwellers with an interest in conservation and the bush.

The book is clearly written and the authors been well served by CSIRO Publishing in the design, layout and printing quality of the images.

The authors acknowledge that they have not studied everything and that extrapolation of their findings beyond the wheat/sheep belt would be inadvisable. This caution is appropriate but a wider audience could still draw general principles from the book

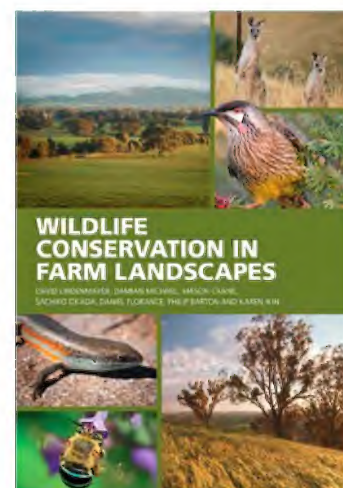
The majority of the book deals with fauna, including invertebrates, and their habitat requirements. The photos alone in these chapters will stir the interest of botanists,

and the chapter on vegetation cover and plants is a model of encompassing a very wide range of topics in a concise and interesting manner.

The book will be a welcome addition to the bookshelves of all those involved with sustainable land management.

Paul Adam

School of Biological, Earth and Environmental Science, UNSW.



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ANPC Workshop Reports

Sandhill Paddock Walk at Wanganella and Morago – 15 September 2016

Following a commitment to return to the preserved Zara sandhill community in spring after an earlier June walk, a fourth successive Paddock Walk was organised by Riverina Local Land Services in south west NSW in conjunction with Landcare, Greening Australia and other agencies, focusing on the Riverine White Cypress Pine Sandhills. Sandhill Pine Woodland in the Riverina is listed as an Endangered Ecological Community under the *NSW Threatened Species Conservation Act 1995*. The woodlands are critical to the health of the region, supporting plants and animals and providing on-farm production benefits when integrated into farming systems.

As with previous Paddock Walks, which aim to increase plant identification skills and highlight the importance of revegetation, ANPC Project Manager and local Conargo property owner Martin Driver was the principal speaker. The day started with the twenty two participants meeting at the Royal Mail Hotel at Boorooban for refreshments and discussion of a native plant and resource display before the group moved south to the local property “Zara”. Situated near the Zara homestead is a fenced reserve that contains a long time preserved extensive sandhill vegetation community. The abundance of species in the reserve was breathtaking with many flowering and setting fruit with highlights including discovering a young White Cyprus Pine nursery and observing Quondong trees with large ripe fruit.



ANPC Project Manager, Martin Driver (left), discussing remnant sandhill vegetation at the fenced reserve at “Zara” on the Paddock Walk on 15 September 2016. Photo: Sally Ware

The second stage of the day involved driving to Ken and Jill Hooper’s Morago property “Moona” to observe a reclaimed sandhill on their property. The many steps required to successfully revegetate a sandhill were outlined by Ken to the group before he led a walk through the sandhill. Ken shared many of his ideas including the erecting of old, dead, hollow trees amongst the young plants to create instant fauna habitat. *This event was assisted by the New South Wales Government through its Environmental Trust*

Sally Ware, Riverina Local Land Services, Hay

Both these workshops were supported by the **NSW Environmental Trust** through its Lead Environmental Community Groups program.



“A growing interest in local native plant conservation”

On Saturday 8 October Martin Driver, ANPC Project Manager, led a walk and discussion about plant taxonomy and identification, as well as native plant management, at Corowa’s Redlands Hill Reserve in the Murray River catchment in southern NSW.

It was a lovely day with over 30 people attending. As well as Corowa District Landcare members, people also came from nearby areas such as Beechworth,

Mulwala, Burrumbuttock and Balldale. The morning began with Martin showing the workshop participants different resources available for plant identification, including a *Guide to Using ‘Plants of Western NSW’* hand-out sheets for more effective plant identification. This was demonstrated as being particularly helpful with identifying the main plant families and their characteristics.

Martin discussed the Redlands Hill Reserve location: "This site's position in the area is interesting. It is between the Riverine Plains and the South-West Slopes, and it has some characteristics of both areas, but as a hilly island in a flat landscape it is quite unique. Some things you'll see here but not elsewhere. This is the sort of season that sets up the site for seed recruitment, driving the system for the next 20, 30 or 40 years. For pines and eucalypts – the plants that germinate now will be around in 300 to 500 years time. Seasons like this drive our native ecosystems."

The participants headed down one of the walking tracks in the Reserve which is dominated in sections by *Callitris* sp. One question put forward was: "How do you identify the difference between White Cypress and Murray Pine?". Martin's response was "it comes down to the difference in the cones. But remember that they can hybridise. Also, younger pines can be subject to borers."

Martin also explained that Redlands is likely to be a *Callitris* germination response from the 1970's. Additionally, he suggested that the area (along the *Callitris* track) may need to be thinned out or it will "lock up" and limit each other's growth. This is carried out by selecting the weaker growths and cutting them off. He also suggested that some areas of the reserve may benefit from controlled burning, in order to encourage natural regeneration, which could be incorporated as part of the Redlands' management plan.



Participants at Corowa's Redlands Hill Reserve for the Native Plant ID and Management workshop on 8 October 2016.
Photo: Judy Kirk

As the walk progressed, Martin noted to the participants that the soil crusts are tufts of moss/lichens that hold surface together and that they put nitrogen into the soil.

Some of the other points that were made include:

- The wet weather this spring will provide the conditions for good summer growth of Kangaroo grass.
- Sweet Bursaria, also called Wild Irishman, harbours a wasp that is very important for lerp control, and is less common now than it was in the days of first European settlement. The leaf has chemical properties that saw it used by indigenous peoples as a sunscreen. An industry in itself at one time, it was grown for this purpose and used by bomber pilots in WW2. Well worth growing/planting, as there isn't a lot of regeneration happening.
- A particular Grey Box tree was described as typical of many on site that have been cut down for timber or mining. Martin pointed out epicormic shoots that have grown up since it was cut about 100 years ago. The base was probably 300-400 years old.
- *Rhagodia hastata* (Salt bush family). Most westerly distribution here at Redlands. You also find the eastern and climbing saltbush.
- Drooping she-oaks exhibiting weeping foliage. Often found on hill tops and stonier ground. Very limited in range now.

Corowa District Landcare volunteers, Joan and Jim cooked a delicious barbeque lunch. Salads and other goodies supplied by the volunteers were also enjoyed by the participants. A special thanks was given to Kerrie Ormond (volunteer) and Joanne Diver (Project Officer) from Corowa District Landcare for preparing for the event and their assistance on the day. Judy Kirk, Coordinator of Corowa District Landcare thanked Martin Driver for the workshop and acknowledged that the funding for the event was supported by the Australian Network for Plant Conservation Inc., the NSW Environmental Trust and also Murray Local Land Services through the Australian Government's National Landcare Program.

Judy Kirk and Joanne Diver, Corowa District Landcare

News

Rare Plants Virtual Issue of the Australian Journal of Botany

As part of the APCC11 conference, the organising committee produced this virtual issue which brings together papers from previous issues of the journal to highlight three important research areas for plant conservation and recovery – genetics, ecology and ex-situ conservation. Please note, articles are now pay per view. <http://www.publish.csiro.au/bt/content/virtualissues?id=1922>

ANPC survey on the Australian native seed industry

During October 2016 Australian seed collectors, growers/sellers/suppliers, purchasers/distributors and other interested parties were invited to participate in a survey, organised by the ANPC, on the status of the Australian native seed industry. The aim of this survey was to gauge the structure and capacity of the native seed industry to meet current and future demand, and to gather feedback on issues experienced within the industry. The survey results were disseminated at the Australian Native Seed Industry Review Workshop held as part of the 11th Australasian Plant Conservation Conference (APCC11). The results of the survey and workshop will soon be made available via *Australasian Plant Conservation* and to the wider community upon request. Thank you to the Rural Industries Research & Development Corporation for sponsoring the survey. Thanks also to Dr. Nola Hancock (Department of Biological Sciences, Macquarie University), Dr Paul Gibson-Roy (Greening Australia) and Martin Driver (ANPC) for developing the survey. <http://www.anpc.asn.au/APCC11/workshop>

UPDATE – February 2017

Due to popular demand, **the survey has now re-opened!** Anyone who is interested in completing the survey, and missed out last year, please email Martin Driver at projects@anpc.asn.au and he will send you the survey link. **Closing date is COB April 28 2017.**



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APCC11 article in New Scientist

Nick Williams from the University of Melbourne spoke about green roofs at APCC11, which was covered by this New Scientist article <https://www.newscientist.com/article/2111566-islands-in-the-sky-used-as-noahs-ark-for-threatened-plants/>

First environmental biosecurity forum creates hope

Protecting Australia's unique ecosystems was the focus of the first environmental biosecurity forum in Canberra in October, hosted by the Australian Department of Agriculture and Water Resources and the Invasive Species Council. This includes protecting our native plants from weeds and plant pathogens, and the ANPC was represented at the meeting by President Linda Broadhurst. <https://invasives.org.au/blog/first-environmental-biosecurity-forum-creates-hope/>

Bjarne K Dahl Trust rebrands as Eucalypt Australia

Bronze Sponsor of the 11th Australasian Plant Conservation Conference (APCC11), Eucalypt Australia, launched on 14 October 2016, is a grant making Charitable Trust that focuses on eucalypts, an Australian icon and a significant aspect of Australia's natural environment and biodiversity. The next round of their small grant program will open in mid 2017. <http://www.eucalyptaustalia.org.au/>



Orchid Conservation Program – fundraising project

The Royal Botanic Gardens Victoria are raising funds to conserve and re-introduce five of the most threatened Victorian orchids. *Caladenia pumila* (the Dwarf Spider-orchid) epitomises the plight of the orchids - thought to be extinct, now rediscovered and sadly down to only 2 wild plants in the world! 100% of all funds raised will go towards the conservation of these orchids, through propagation, pollination studies and re-introducing these plants back to the wild. All donations are tax deductible. The RBGV's Orchid Conservation Program is the most successful orchid re-introduction program in the world, and the ANPC is proud to be involved. <https://www.rbg.vic.gov.au/science/projects/orchid-conservation>

3rd Australian Mangrove and Saltmarsh Network Conference – Hobart, 21-24 March 2017 'Coastal frontiers: saltmarsh and mangroves'

CSIRO and the University of Tasmania are proud to host the 3rd Australian Mangrove and Saltmarsh Network Conference (AMSN). The conference brings together researchers, industry, community and environmental consultants to discuss the latest science and management for saltmarsh and mangrove ecosystems. The conference involves two days of presentation with the following broad themes: The first line of defence in global change – saltmarshes and mangroves; and Working with nature: science and community management of our coastal wetlands for healthy waterways. <http://www.utas.edu.au/land-food/geography-and-spatial-sciences/amsn-conference-2017>



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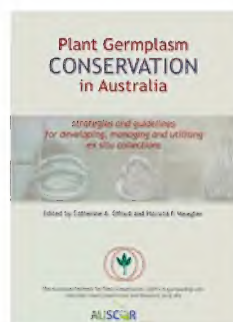


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Research Roundup

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Centre for Plant Biodiversity Research. Canberra. Email: Kirsten.Cowley@csiro.au

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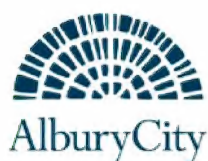
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